

One should note that the distributed data processing system might also include numerous different types of networks. Any one of, or any combination of, for example, an intranet, a local area network (LAN), a wide
5 area network (WAN), or an aggregation of units may connect to each other in a fashion. Any of the connections may be wireless in nature.

If using the network in a secure fashion, the network may
10 be local to the individual clients. In another manner, such a secure network may be implemented upon a public network using various security protocols, thus creating a virtual secure network (VSN) molded from the public network infrastructure. In addition, the present
15 invention may be implemented on a variety of hardware and software platforms, as described above.

Assume that any of the devices attached to the network 12 may, in the course of their operation, encounter difficulties. In an embodiment of the invention, an
20 operations device 28 is coupled to the network. The operations server contains server routines and boot images, and thus is able to reboot any of the devices associated with the distributed network 10 in a manner that diagnoses and corrects problems or perform
25 maintenance.

The invention is accomplished by downloading a specific new boot image, rebooting, and having the target device perform the functions through the new boot image. Upon completion, the original image swaps back and the target
30 device initiates another reboot process. This allows the target device to return to the original operations state with the original boot image that it was previously running on.

In this case, assume that the computer 14 is running a particular operating system through a boot image. The operations server may remotely diagnose or treat problems on the computer 14 through network interaction.

- 5 Alternatively, the process begins through human intervention, or through an automated process such as a timed maintenance program or a diagnostic program running either local to the device 14 or over the network.

- 10 In the boot image manager, the system selectively picks the target client and/or the target action. The operations server then initiates a remote boot of the target machine with a specifically chosen boot image.

- 15 The specific boot image is delivered to the target machine via network interaction, and the target is then rebooted. The reboot may be initiated either locally at the target machine or over the network from the operations device or from another remotely located device.

- 20 When the target undergoes the reboot, a new boot image, as specified by the operator, is initiated in the target machine. This makes the target machine operate in a specific manner, as specified by the new boot image.

- 25 The new boot image may take many forms, and perform varied tasks. For example, the boot image may perform diagnostics on the target machine hardware and software configuration. In this manner, such actions as a disk boot sector repair after an infection may be performed. Alternatively, specialized boot images may be designed so that complex interactions between the hardware may
30 be analyzed more thoroughly, and in a way previously unable in the original boot image.

In one embodiment of the invention, the specialized boot process runs to completion. A software process (daemon) operating on the operations server may monitor the process on the target machine. Upon completion of the
5 diagnostic or maintenance boot operation, the daemon senses condition and initiates a switch of the client back to operating under the original boot image.

The daemon may perform in an active or passive manner. In an active manner, the daemon would monitor the
10 process, perhaps by polling the boot image for update information. In this case, the operations server would be an active participant in the process, and may be able to supply added data or specific subroutines to run on the target machine as necessary.

15 In the passive mode, the daemon would simply await the completion signal from the maintenance boot image. In either case the daemon signals the completion of the maintenance or diagnostic action of the specialized boot
20 image to the operations server.

The operations server may then direct that the original boot image be swapped back into the target machine. Upon another reboot, the target machine operates in its usual operational manner. The reboot may also be initiated
25 remotely or at the target machine.

The operations server may contain several boot images for the target machines. These boot images may be for boot images to allow the machines to operate in a normal fashion. Additionally, it may contain the specific
30 maintenance and/or diagnostic boot images.

In other embodiments, any or all these boot images may be stored in various places where the operations server might access them. In this manner, the storage of the